A Public Space for the Digital Age

A Digital Design Build Workshop

Gernot Riether
Associate Professor
College of Architecture and Design
New Jersey Institute of Technology
griether@gmail.com

Abstract

With Information Technology such as smart phones we use public urban space differently. For example prior to cell phones people would meet in a public space by agreeing on a specific meeting location and time. Using cell phones people meet more spontaneous. Cell phones also allow people to be engaged in a very private phone conversation in the middle of a public space. In spite of information technology creating new uses for public space urban planners are still relying on old paradigms in designing and constructing it.

A workshop was formulated around the question: How can we design urban spaces for a digital culture? The achieved outcome of the workshop was the design and realization of a public space that addresses this challenge.

To do that students were asked to come up with new functions for public spaces, test materials, help seeking for funding and creating partnerships with the city, the industry and nonprofit organizations. During the duration of a one-semester timeframe the studio was facing a series of challenges dealing with the design, fabrication and realization of an urban space. This paper will describe the challenges of designing urban spaces for a digital culture, the structure of the workshop, the interventions made during the process and the final project, an urban landscape titled “Urban Blanket” that was build in Midtown Atlanta.

Keywords: Public Space; Information Technology; Digital Fabrication; Thermoforming; Simulation

Challenge

Before radio, TV, and the Internet existed, citizens used public spaces when they wanted information or needed to supply goods. They gossiped or engaged in heated public debates. They brought home water from the well or bartered and traded goods and developed relationships in these spaces. Today, desired information is delivered 24/7 via a diet of individually tailored Internet services such as Hulu, Pandora, and a host of others. We debate each other anonymously in the comments sections of our local newspapers. Our new friends on Angie’s List will tell us what goods we need, and Amazon will deliver them to our door. Step by step, public space has ceded the exclusiveness of its essential role.

Figure 1: Urban Blanket at Midtown, Atlanta

However people enjoy sharing spaces with their community. Coffee shops filled with people working on laptops are proof that many citizens favor sharing a space with strangers over sitting at home on their own. Offering free Wi-Fi boosts numbers of customers in coffee shops; Starbucks offered free Wi-Fi in all of their coffee shops since 2010. Public space on the other hand did not respond to the development of information technology in the same way. As public space has lost

it's original role information technology can create an opportunity to reclaim these essential functions.

Public spaces today are typically classified into different types of spaces such as a park, a sidewalk or a street. Each of these types of spaces is then designed following a vocabulary of typologies such as a curb, a bench or a lawn. The typologies that we use to design public space do not take into account the way we communicate and navigate the city through digital devices.

Information technology has shifted the relation of space and function: One might check e-mails, write messages or do phone calls from the bedroom or the kitchen instead of the office. Information technology has also changed how we think about the use of devices. Single application devices are increasingly combined into hybrid devices. A smartphone is not just a phone anymore. Thinking about public space in the same way one might imagine people using the sidewalk as a new work environment or a street as an environment that is not just designed for cars.

Streets can be blocked off for a parade, a movie screening or a concert. In which cases they are temporarily transformed from a single function space to an event space. A truly hybrid urban space would be different as it would allow for people to listen to a concert, watch a movie and being used as an office at the same time. It would therefore not seek for the event, that is planned and festive but for happenings that are the result of chance and accident. Providing a space to accommodate citizens using information technology might also create an alternative to privately owned spaces such as shopping malls or coffee places that is participatory, more inclusive and more democratic.

Workshop:

In a 2nd year workshop at Kennesaw State University students were challenged to respond to these issues. The workshop was structured into six parts: 1) Project proposals 2) Project development 3) Prototyping 4) Finding collaborators and funding 5) Realization and installation 6) Documentation.

Students first developed ideas individually. After the first week each of them presented sketches and small study models in a pin up in front of an invited jury. Based on their ideas students were then asked to team up in groups of 2-5 to respond to the feedback from the jury and to develop their ideas further. After the second pinup three very different ideas emerged. After discussing each of them and debating of how these different ideas might be realized in different ways students were asked to vote on the project that they would like to see realized.

Figure 2: Design session at the first day of class

At the beginning of the 3rd week students formed teams again. This time each team was testing different methods to realize the selected project. The project that had emerged was an undulating landscape. Based on the proportions of the human body the project was optimized to cradle people using laptops, tablets and smart phones. About 20 people could occupy the proposed landscape. The challenge then was to construct a 15' x 15' continuous surface of complex curvature for an out door space. Teams experimented with different materials, different strategies to modularize a surface and different ideas details to connect the individual pieces to a homogeneous hole.

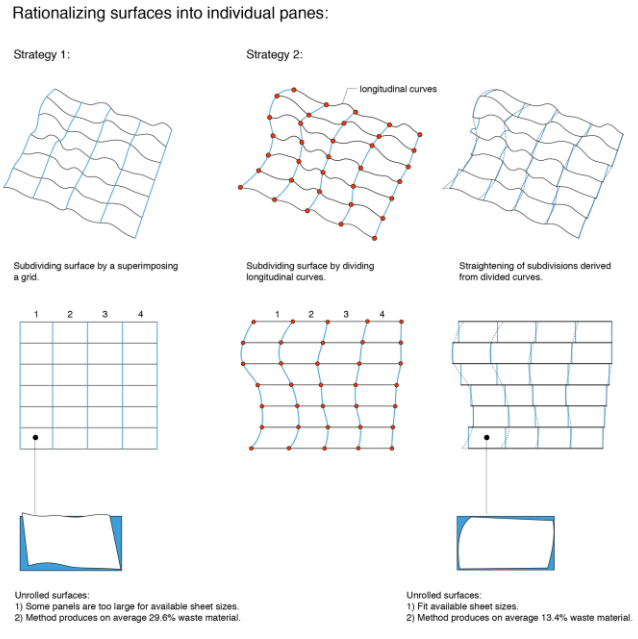

Figure 3: Strategies to rationalize the surface into testable sizes

The material decided for the project was HI-MACS, a sustainable polymer that was locally produced by LG Hausys. HI-MACS is a material that is typically used for kitchen counters and bathroom finishes. The material is strong and easy to maintain. Its surface durability is similar to natural stone. It is seamless and non-porous and has excellent hygienic properties. The material can also be thermoformed into very complex geometric shapes. The studio met with LG Hausys to discuss a partnership. The company was interested in the idea for three reasons: 1) The project would experiment with a new application for their material product, 2) The project would test their material typically used for indoor spaces in an exterior setting and 3) The project being located in a public space would draw attention to their product. LG Hausys therefore agreed to provide us with free material and technical support.

Figure 4: Models made from wax, fabric, paper and form to simulate the performance of HI MACS in an plastic state

The studio also applied for funding from the architecture school at Kennesaw State University to cover the cost for materials required for the mold, foundation and connection details as well as transportation and installation. The studio also developed relationships to two community organizations in the Atlanta: 1) Modern Atlanta (MA), a nonprofit organization that promotes design and architecture in Atlanta by organizing annual architecture tours, lectures and exhibitions and 2) Sandbox, a community organization that works for developers in Midtown Atlanta to activate public space around their properties through organizing events and installing art projects. MA agreed to help promoting the space and Sandbox agreed to help finding a site for the project.

At week 6 construction of the Urban Blanket started. Students teamed up for different parts of the fabrication process: Nesting and routing the parts of molds from plywood, assembling molds, thermoforming, finishing thermoformed parts and assembling final components. The fabrication of Urban Blanket took 4 intense weeks. The studio had to develop a precise schedule that took into account the availability of the woodshop, the availability of the fabricator's workshop, delivery of materials and the already tight schedule of other courses students took parallel to this workshop.

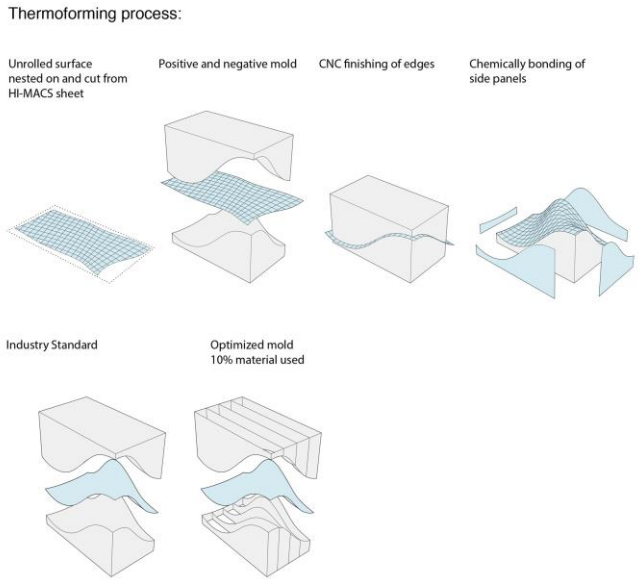

Figure 5: Thermoforming process

After all components were finalized the components were delivered to the final site in Midtown Atlanta. The project was conceptualized to allow for rapid installation. This was necessary to not interrupt vehicular and pedestrian traffic. Within less than two hours the entire landscape was unloaded and assembled on site. During the summer the project was monitored and documented.

Design:

In the prototyping phase the studio discovered a novel way to create a mold using only 10% of material of what the industry is using to do the same. Instead of using solid wood molds to form complex curvatures a system of ribs was used. This could only be achieved by using certain curvatures that create a tension in the sheet that prevents the material to sag between the ribs. Designing the curvatures created a unique challenge: The curvature of each ripple in the landscape had to respond to three competing conditions at the same time: 1) The proportions of the

human body, 2) The behavior of the material in its malleable state and 3) The landscape had to provide rainwater to run off its surface avoiding the forming of paddles at rainy days.

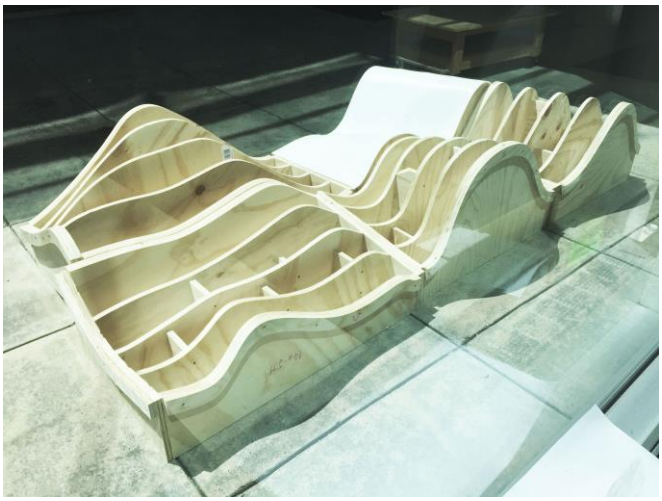

Figure 6: First prototype of Urban Blanket

After experimenting with different methods to design such a surface a combination of two methods proofed beneficial: 1) Physical models were developed from sheets of wax. By changing the thickness of a sheet of wax the studio could simulate HI-MACS fairly accurately in its malleable state. If a curvature were too small, the wax would crack. This method allowed the studio to very quickly test different configurations of ripples against their function as seating arrangements. 2) The plugin T-splines of the 3d software Rhinoceros 3D (Rhino) was necessary to model a rippled surface, especially for modeling folds in the shape of a Y as you would find in wrinkled fabrics. The curvature analysis tools of Rhino were critical during this form finding process. Color-coding of the digital surface allowed direct feedback of the targeted curvature while modeling the surface. During this process digital models were 3d printed and routed and physical models were 3d scanned in order to compare both investigations.

The surface that resulted from this process was then tessellated which created another challenge difficult so solve. Superimposing a grid on a complex curved surface provided components equally sized in plan but very different in size and geometry once unrolled. Ending up with similar size unrolled surfaces required a cutting pattern that followed the curvature of the folded surface in a different way. Breaking up the surface into parts equal in size once unrolled created components with curved edges in plan that were difficult to nest on a sheet of material that only comes in certain sizes. To solve this problem the surface was first tessellated following the curvature. The resulting edges were then simplified into strait lines. As a result of this method components were different in their planar projection but could once unrolled nearly fit on equally sized panels. This avoided material waste and simplified production.

HI-MACS comes in sheets 8’ long and 2 ½’ wide. The unrolled surfaces had to be between 4’ x 2 ½’ and 6’ x 2 ½’ in size in order to nest two modules on each sheet. To thermoform all components the studio teamed up with a fabricator that had an oven just large enough to fit the sheet sizes used for the project. Top South, a fabricator specialized in custom made counter tops and located close to the school’s campus gave the studio an introduction of the thermoforming process after which the students could tame over their facility.

Thermoforming a complex curved surface by compressing it between a positive and negative mold created another challenge. In the process of moving the heated material from the oven and placing it accurately on the mold a tolerance had to be taken into account that would have resulted into extra waste material that would have had to be removed after the thermoforming process. The studio responded to this challenge in two ways: 1) Guides were mounted to the mold to accurately locate the heated surface. But even with these guides the mold did not provide the precision needed to connect all 34 components into a seamless landscape. 2) In addition to the guides the studio decided to leave a one inch tolerance and to use CNC to finish each component after the thermoforming process. This guaranteed for the required precision. The path of the router in this case had to follow the curved surface. Some of the curves used created surfaces of steep angles that required the use of all 5 axes in the routing operation.

Each component was made from a curved top sheet and 4 flat side sheets. The side sheets were nested and routed from 8’ x 2 ½’ sheets and chemically bound to the thermoformed top sheets. To connect them to the top sheets the rip structure of the mold was used as scaffolding. The rip structure also served to support the ¼” shell structurally and therefore remained in each component after it had been used as a mold. In the final installation the bottom of each components was left open. To protect the wood structure from rainwater spacers raised the structure from the floor. A better but also more expensive response would have been to entirely enclose each component by adding a bottom sheet of HI-MACS. Chemically binding the side and top sheets allowed for a structural connection between the top and the sidepieces. Sanding and polishing the

joints provided the seamless look of monolithic components.

Breaking up the landscape into components approximately 5' x 2 1/2' made the transportation very easy. On site the components were placed on a grid of 2" x 4" wood beams that were assembles into a grid. This planar base was necessary to perfectly align all components, which created the effect of a seamless large blanket hovering above the plaza. This method of assembly allowed moving the project between different urban spaces. It allowed to expand and shrink the project and to adapt it to different site conditions. Modules could be set up as a continuous surface or displayed as a staggered or fragmented landscape.

Centergy Place was the project's first site The square is located in Midtown Atlanta on 5th street between Spring Street NW and Interstate Highway 75. Centergy Square was selected as the project's site for two reasons: 1) The square has a very high pedestrian frequency, but all pedestrians are crossing the square without pausing or lingering in the square. 2) There is free Internet provided by businesses around the square. Placing the project at the entrance of the square and next to the side walk created an urban space ideal for people that are working in the buildings around the square to enjoy lunch breaks, and other passer buys to rest, checking e-mails or work on their laptop without having to pay for a coffee as they would in the Starbuck across from the site.

One of the biggest challenges for urban spaces in Atlanta is the hot summers. A white color was used to reflect the sun. HI-MACS also has a very high thermal conductivity. It is a cold material. This performance was used to help cooling down the body during the hot summer days. The bottom of each module was kept open. Floating the modules 1 ½" from the ground allowed air to circulate through the interior of the modules avoiding heat build up when temperatures are very high.

The project was titled "Urban Blanket" suggesting a picnic blanket in a park that could be occupied my one person, a couple or a group of people. Located between a sidewalk and a square Urban Blanket could be occupied by more than 20 people simultaneously creating new forms of social interactions. The name "Urban Blanket" provided an identity for an urban space that could be easily remembered and referred to.

After the project was installed students were monitoring Urban Blanket for a period of three weeks during the summer. Taking pictures showed that the created urban space not only attracted the expected users, such as citizens having their lunch break but also unexpected uses. Waiting for the bus to arrive at a close by – still in sight - bus stop, people using it for their workout and doing pushups, kids having fun climbing it, citizens doing photo shoots and students meeting and hanging out. After attracting citizens for two weeks WABE, Atlanta's NPR radio station conducted interviews asking citizens what they think about Urban Blanket. Feedback from citizens included: "I love to sit there with my legs propped up," "I first thought it is a piece of art so I did not know I can occupy it," "It's very provocative." More interviews and feedback can be found on NPR's webpage.

Conclusion:

In many cities in the US the government often does not see a value in investing tax dollars in high quality public space. Developers on the other hand are discovering that a well functioning public space is vital to create foot traffic that contributes to the success of businesses such as stores with storefronts facing sidewalks. This has created a market for "Community Organizations" to activate public space. Also they are business driven the quality of public space is certainly improving for the public benefit.

The project was successful in building new bridges between developers and such community organizations but also between material manufactures, architects, urban planners and the city. Urban Blanket resulted from collaborating with Modern Atlanta, a platform for Art and Architecture in Atlanta, the community organization Sandbox crew and the nonprofit organization Midtown Alliance. Top South provided access to their state of the art facilities that allowed to thermoform the 8' long panels of HI-MACS into complex configurations. Mike Marks from Top South said: "I enjoy teaching the art of fabrication to willing students. Especially students that will one day be a part of designing future projects that may lead to jobs that utilize the full scope of design possibilities of the material."

Since people spend so much time living in online communities, the project intended to attract people to the physical public space. With Urban Blanket the studio is rethinking physical public space in the context of mobile digital devices. It is an urban landscape designed for people to share while lounging and using digital devices. Upgrading Atlanta's public space with an environment designed for a digital culture Urban Blanket provides a new identity for a different kind of public. Communities are often created within the confines of businesses such as coffee shops. Urban

Blanket creates the same kind of café community without forcing people to buy something.

The design process provided students access to all digital design fabrication tools of the College of Architecture and Construction Management at Kennesaw State University. Students worked with Material Scientists, fabricators to learn about the properties and the production of HI-MACS. As a result the studio developed a novel fabrication workflow for complex HI MACS surfaces, developed a prototype for a new application for HI MACS and created a novel urban space for a local community.

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